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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/821,415	03/28/2001	Yehiel Gotkis	LAM2P246	3672

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MARTINE & PENILLA, LLP  
710 LAKEWAY DRIVE  
SUITE 170  
SUNNYVALE, CA 94085

EXAMINER
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VU, HUNG K

ART UNIT	PAPER NUMBER
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2811

DATE MAILED: 05/22/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/821,415

Applicant(s)

GOTKIS ET AL.

Examiner

Hung K. Vu

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 28 February 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 6-8 and 26-35 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 6-8 and 26-35 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

### **DETAILED ACTION**

1. Applicants' communication filed 07/24/02 has been carefully considered by examiner. The arguments advanced therein are persuasive with respect to the rejections of record, and some of those rejections are accordingly withdrawn. In view of a further search, however, a new rejection is set forth further below. This action is not made final.

#### ***Election/Restrictions***

2. Applicant's election without traverse of Invention of Embodiment 2, Figure 1F-2 and 1F-3, Claims 6-8 and 26-35 in Paper No. 10 is acknowledged.

#### ***Claim Objections***

3. Claims 27 and 33 are objected to because of the following informalities: In claims 27 and 33, line 2, "the" should be changed to "a" for clarity. Appropriate correction is required.

#### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 6-8 and 26-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sekiguchi (PN 6,333,255) in view of Ahn et al. (PN 6,277,728, of record).

Art Unit: 2811

Sekiguchi discloses, as shown in Figures 4(c) and 5(c), a semiconductor device comprising,

a substrate (1) having transistor devices [Col. 12, lines 55-61];

a plurality of copper interconnect metallization lines and conductive vias (17, two outside lines) defined in each of a plurality of interconnect levels of the semiconductor device, the plurality of copper interconnect metallization lines and conductive vias being isolated from each other by a low-k dielectric material [Col. 12, lines 61-65, Col. 13, lines 24-39, and Col. 17, lines 1-10];

a plurality of supporting stubs (17, two inside lines), each of the plurality of supporting stubs configured to form a supporting column that extends through the plurality of interconnect levels of the semiconductor device. Note that it is inherent that the two inside lines provide support structure.

Sekiguchi does not disclose the low-k dielectric material is a porous dielectric material.

However, Ahn et al. discloses the plurality of copper interconnect metallization lines and conductive vias (48,54,70) isolated from each other by low-k dielectric material (56) including a porous dielectric material. Note Figures 1-12 and Table of Ahn et al.. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the low-k dielectric material of Sekiguchi by a porous dielectric material, such as taught by Ahn et al. because a porous dielectric material is commonly used as the interlayer dielectric material and it helps to reduce the coupling capacitance between the interconnects.

Art Unit: 2811

With regard to claims 7 and 30, Sekiguchi and Ahn et al. disclose the plurality of supporting stubs is not electrically interconnected to the plurality of copper interconnect metallization lines and conductive vias [see Figures 4(c) and 5(c)].

With regard to claims 8 and 31, Sekiguchi and Ahn et al. disclose the device further comprising a passivation (19b) defined over a topmost layer of the copper interconnect metallization lines and conductive vias [see Figures 4(c) and 5(c)].

With regard to claims 26 and 32, Sekiguchi and Ahn et al. disclose the plurality of copper interconnect metallization lines and conductive vias define dual damascene structures [see Figures 4(c) and 5(c)].

With regard to claims 27 and 33, Sekiguchi and Ahn et al. disclose the plurality of supporting stubs further support a passivation layer (19b) [see Figures 4(c) and 5(c)].

### ***Response to Arguments***

5. Applicant's arguments with respect to claim 6 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hung K. Vu whose telephone number is (703) 308-4079. The

Art Unit: 2811

examiner can normally be reached on Mon-Thurs 7:00-4:30, alternate Friday 7:00-3:30, Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Vu

May 13, 2003

Hung Lu